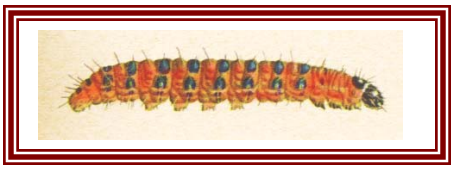
Cactoblastis cactorum Activities Report for October 2006





For past reports and more information, see the PPQ Cactus Moth website at:
http://www.aphis.usda.gov/ppq/ep/emerging_pests/cactoblastis/index.html

Joel Floyd, USDA-APHIS-PPQ-EDP, Riverdale, MD

MEETINGS. The North American Plant Protection Organization (NAPPO) held their annual meeting in Ft. McDowell, Arizona with representatives from the United States, Mexico, and Canada discussing various trilateral trade and pest issues. Stephanie Bloem gave a presentation on the current situation cactus moth programs in the U.S. and Mexico and an update on the cooperative cactus moth program between SAGARPA and USDA. A side meeting was held with Mexican (SAGARPA and CONABIO) and USDA-APHIS representatives to discuss funding and cooperative efforts in both countries.

An International Cactoblastis Conference is being planned for the week of May 21-24, 2007 held and co-hosted by the Desert Botanical Garden in Phoenix, AZ. A visit to the Garden showed it to be an ideal venue, with excellent facilities and a large living collection of *Opuntia* species from both the United States and Mexico.

SURVEY: Richard Brown identified various non target moths captured in cactus moth traps in Arizona (48 traps, nurseries, APHIS), Mississippi (12 traps, Grand Bay NWR), South Carolina (15 traps, Charleston, APHIS) and Texas (21 Traps, Galveston, APHIS; 3 traps Padre Island NS). One trap from Puerto Rico positive for *C. cactorum* checked as part of an ongoing data gathering study for modeling cactus moth phenology in southern latitudes. Dr. Brown also reared adult specimens of native cactus feeding species collected in the Southwestern US; they are awaiting identification. Additional larvae were placed in environmental chambers at conditions that could induce diapause. New sentinel sites were added in North Carolina and Mississippi.

OUTREACH: National Public Radio ran a story in October called "Cactus Moth Threatens Mexico's Nopal Crops". It is available for listening with a media player at:
http://www.npr.org/templates/story/story.php?storyId=6387508&ft=1&f=1004&sc=emaf
Click on "listen to story" and then on the headline to the story using a RealAudio or WindowsMedia player. A related Nature Conservancy on-line article is found at:
http://www.nature.org/initiatives/invasivespecies/misc/art19241.html

REGULATION. The Florida Nursery Growers and Landscape Association expressed the need for a certification program for shipping nursery host plants from Florida to non-infested states. A Technical Panel is being formed to explore the certification requirements for incorporation into the regulation.

PPQ FIELD ACTIVITY: Maurice Duffel was hired as the supervisor for the Cactus moth program stationed at the Pensacola office. Maurice supervised the work of TDY personnel Jason Jones, Kris Hartzer, and Bill Bryant in Ft. Morgan and Bon Secour checking traps, replacing lures and making sterile releases. Over 4 tons of infested host material was destroyed and egg sticks were collected. Craig Hinton worked with Stephen Hight in trapping and host removal at Dauphin and Little Dauphin Islands, AL.

TECHNICAL LIAISON. Stephanie Bloem collected and compiled all reports for October program activities.

George Schneider, Florida Department of Agriculture and Consumer Services-DPI, Gainesville, FL

ACCOMPLISHMENTS AND ACTIVITIES. The Biological Control Rearing Facility (BCRF) is modifying 400 larval containers purchased for use in the program. The adult moth/pupal eclosion cage has been slightly refined and an order for 10 will be placed shortly. Design of the adult moth scale collection unit is underway as is the purchase of an incubator for egg sticks and an environmental chamber for adults. On October 6th, the USDA-ARS laboratory in Tifton sent egg sticks, cladodes, and 400 containers with larvae for rearing in Gainesville due to space constraints at their facility. On October 16th, 1,700 cladodes were received from the USDA-APHIS facility in Edinburg, TX. We processed and stored half of the cladodes for use in rearing larvae. The additional cladodes were picked up by Tifton for use in their colony. The first pupae were collected at DPI on October 27th. Pupae will be returned to Tifton for use in the field program.

Stephen Hight, USDA-ARS-CMAVE Tallahassee, FL
Jim Carpenter, USDA-ARS-CPMRU, Tifton, GA

SIT VALIDATION. Traps were serviced at SIT sites weekly during October. Total and average trap captures of wild males at each site is presented in Table 1. The average number of wild moths found per trap in October is based on weekly averages over four weeks. Releases of sterile *C. cactorum* were made at three Alabama sites during October (Table 2). Weekly recapture information at Ft. Morgan is presented in Table 3 and Figs. 1 and 2.

Table 1. Wild *C. cactorum* (Cc) caught in traps 1-29 October 2006.

Location	Dauphin Is., AL	Little Dauphin Is., AL	Ft. Morgan, AL	Pensacola Beach, FL
# Traps	53	5	16	70
# Wild Cc	4	13	624	267
Avg. # Wild Cc/Trap	0.02	0.6	9.8	1.0

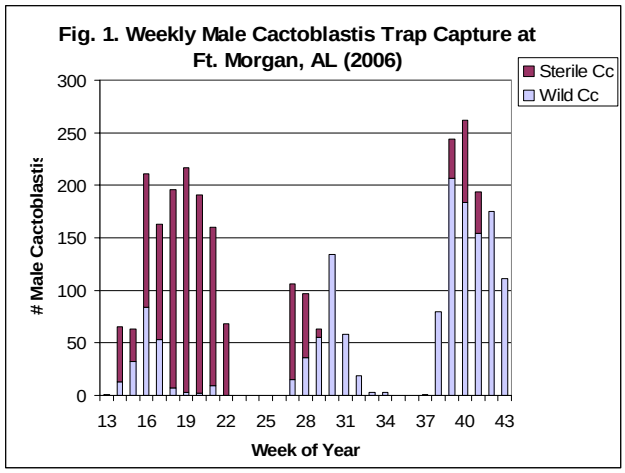
Table 2. October release totals of sterile *C. cactorum* made at three Alabama sites.

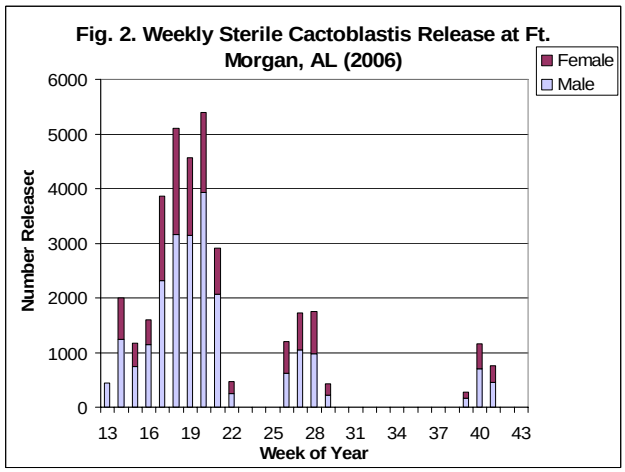
LOCATION	NUMBER OF STERILE Cc RELEASED

	♂	♀	TOTAL
Ft. Morgan, AL	1,161	755	1,916
Little Dauphin Island, AL	2,034	1,284	3,318
Dauphin Island, AL	1,231	637	1,868

Table 3. Weekly *C. cactorum* (Cc) trap capture, number of sterile moths released, and percent sterile males recaptured at Ft. Morgan, AL, February - October 2006.

MONTH	WEEK OF YEAR	Cc CAPTURED		STERILE Cc RELEASED		% STERILE ♂ Cc RECAPTURED
		WILD ♂ Cc	STERILE ♂ Cc	♂	♀	
February	8	0	--	--	--	--
March	12	0	--	--	--	--
March	13	1	0	443	0	--
April	14	13	52	1236	758	3.1
April	15	32	31	747	422	4.2
April	16	84	127	1144	456	11.1
April	17	52	110	2312	1547	1.5
May	18	7	189	3163	1942	6.0
May	19	3	214	3139	1433	6.8
May	20	2	189	3925	1475	4.8
May	21	9	151	2073	836	7.3
June	22	0	68	245	226	27.8
June	23	0	0	0	0	0
June	24	0	0	0	0	0
June	25	0	0	0	0	0
June	26	0	0	616	578	0
July	27	15	91	1044	680	5.5
July	28	36	61	975	782	6.3
July	29	55	8	220	206	3.6
July	30	134	0	0	0	0
August	31	58	0	0	0	0
August	32	19	0	0	0	0
August	33	3	0	0	0	0
August	34	3	0	0	0	0
August	35	0	0	0	0	0
September	36	0	0	0	0	0
September	37	1	0	0	0	0
September	38	80	0	0	0	0
September	39	207	37	172	110	21.5
October	40	184	78	703	449	11.1
October	41	154	40	458	306	8.7
October	42	175	0	0	0	0
October	43	111	0	0	0	0





ECOLOGICAL AND QUALITY CONTROL FIELD STUDIES. Field Trial of Pheromone Blends (collaboration with Epsky/Heath). A field trial was conducted in October at Pensacola Beach assaying three different blends/formulations of the experimental cactus moth lure. Trap captures were compared against captures with standard lures and newly emerged, virgin, females. Traps were serviced twice per week and the experiment ran 3 – 27 October (4 weeks).

Flight Periods and Degree-Day Model. Trap bottoms sent by collaborators were scored. In general, the fall flight period occurred from September to mid-October in south Florida, began in mid-September and lasted through October in north Florida and coastal Georgia, and began late September and lasted through October in coastal South Carolina.

COLONY MAINTENANCE, BUILD-UP AND MASS-REARING. Cladode Rearing. 250,000 eggs were collected and 109,768 larvae were set up during October. Approximately 78,902 pupae were collected and 3,070 were shipped to cooperators in Zurich, and 2,600 were shipped to Miami for pheromone studies. Four hundred containers were transported DPI, Gainesville, FL.

Artificial Diet Rearing: Diet trials to evaluate cooked and uncooked diets, diets with reduced amounts of methyl paraben, and with lower pH were initiated. Diet was cooked in the autoclave

at 250^{o} F and 18 psi and different organic acids found in cactus plants (i.e. malic, oxalic, and citric) were incorporated to lower pH. Preliminary data suggests there may be some benefit from cooking the diet and lowering the pH with organic acids.

Diets supplemented with sterols and minerals in low pH diet (4.0-4.7) were also evaluated. Sterols were incorporated in increments (1, 2, 4g/l) suspended in soy lecithin to homogeneously mix into the diet. Potassium sorbate and Beck's Salt were also added to provide essential vitamins and minerals. Initial results suggest some relationship between sterol concentration and pupal size. In addition, we are seeing increased pupal weights in potassium sorbate and Beck's Salt diets.

We are also evaluating incorporation of cactus and carrot flour in low pH diet. These insects have just begun pupating, so there is not enough information to make any assumptions from this data.

RADIATION BIOLOGY TRIALS. In cooperation with Carl Gillis, FL Accelerator Services and Technology, DPI, Gainesville, FL, we are evaluating the feasibility of using the accelerator to sterilize cactus moths produced in the DPI insect rearing facility. The target dose of radiation (200 Gy) has been calibrated to national standards. Trials have been initiated to verify the dose of radiation delivered by the accelerator that provides the appropriate biological response. Dose response variables include fertility, fecundity, longevity, mating success, F_1 survival and F_1 sterility.

S. Dorn, M. Sarvary, ETH Zurich, Switzerland

Studies on Dispersal Ability

1. The computer used to program photoperiod has been upgraded to a high-tech light system that can program both the flightmill and the actograph using the same touch-pad.
2. In pupal shipments success rate of adult emergence has reached ca. 70% due to the improved rearing methods. Fewer than 5% of the adults emerge with crumpled wings.
3 A logging device (HOBO) was added to each pupal shipment sent from Tifton, GA to Switzerland. Data from the loggers was checked and temperature measured during shipment is plotted weekly. Pupae are traveling at temperatures between 14 – 28 degrees C.

R. Heath, N. Epsky, USDA-ARS-SHRS Laboratory, Miami, Florida

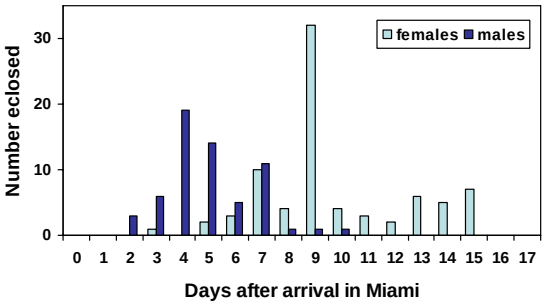
ACCOMPLISHMENTS AND ACTIVITIES. Three shipments of cactus moth female pupae were received from Tifton. Eclosion rates from these shipments are presented below. Four sets of gland extracts were obtained, which consisted of 39, 41, 37 and 41 glands. Due to the problems with the GC-MS, we contacted Tifton to stop pupal shipments until we confirmed that our new GC-MS was functional. The new GC-MS was installed and is functional. Analysis of these gland extracts will resume in November. We have also requested that pupal shipments be resumed. The new volatile collection systems will allow collections from a large number of calling females.

Sept. 26 – Oct. 17 cactus moth pupae shipments

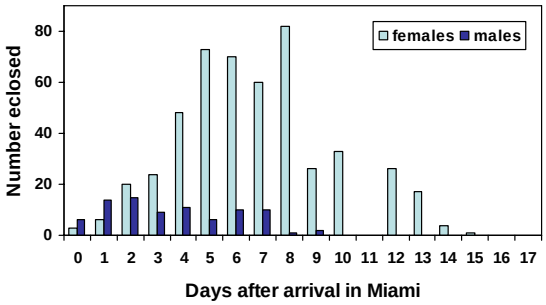
	Mean eclosion time (days after arrival)	Peak eclosion (days after arrival)	Number of pupae arrived from GA	Number of moths eclosed	Percent eclosion	Number of damaged moths	Percent viable adults
September 26							
Total			200	140	70	35	53
Females	9.8	9	100	79	79	18	61
Males	5.0	4	100	61	61	17	44
October 3							
Total			1130	577	51	192	34
Females	6.8	8	978	493	50	332	34
Males	3.6	2	152	84	55	53	35
October 11							
Total			749	328	44	32	40
Females	9.9	9	542	227	42	19	38
Males	4.0	4	207	101	49	13	44
October 17							
Total			706	230	33	32	28
Females	9.4	13	504	149	30	18	27
Males	6.1	4	202	81	40	14	31

Females eclosed per day.

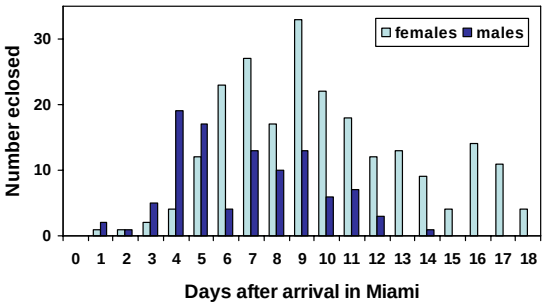
Sept. 26 shipment



Oct. 3 shipment



Oct. 11 shipment



Oct. 17 shipment